

Michał Kokowski (ed.), *The Global and the Local: The History of Science and the Cultural Integration of Europe. Proceedings of the 2nd ICESHS (Cracow, Poland, September 6–9, 2006)*.

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## CHAPTER 3 . / Round-Table Discussion 0.

*History of science in  
education and training in Europe:  
What new prospects?*

***Chaired by:***

**Claude Debru** (Paris, France)

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**Introduction \* by Claude Debru (Paris, France) \*\***

THE CREATION OF the European Society for the History of Science in 2003 in Paris was a highly significant event in the cultural integration of Europe for our academic field. It was the consequence of several moves taken by scientists and historians of science, helped by European academic and political institutions, national Academies, the All European Academies network, the European Commission DG Research, the DHS / IUHPS, which were eager to encourage a better use of the big amount of excellent research performed in the field of the history of science, technology and medicine, at the higher and general education levels. At a Conference held in Strasbourg in 1998, with participation of representatives from 26 countries, it was decided to encourage governments to develop the teaching of the history of science, technology and medicine in scientific, technical, medical and humanistic (history, philosophy) university curricula, and to start thinking in a more systematic way about the use of the history of science in the teaching of scientific subjects and in the creation of a scientific culture and a scientific way of thinking at secondary schools.<sup>1</sup> Governments were urged to create university positions in history of science and to establish national and regional centres to foster and organise research and teaching. As a matter of fact, encouraging signs came from several governments in Europe, and a number of positions were created in Italy, France, and in other countries as well. The idea of creating a European society for the history of science was also mentioned at the 1998 Conference. The Society could be created after several meetings in Paris, and its first Conference took place in 2004 in Maastricht.

It is time now to get a clearer view of the present situation and of the possible ways to foster co-operation between all parts of Europe in these fields. The Cracow Conference offers a marvellous opportunity for discussing these issues. There are many institutional tools of academic co-operation in Europe. The Erasmus / Sokrates exchange system for students is widely used. Bi-national universities, like the French-German University in Saarbrücken and the French-Italian University in Grenoble are increasingly used; they provide funding for integrated curricula at several levels of University education — especially at the master level, which is a particularly significant level. European doctoral schools do exist in several disciplines. The European Science Foundation provides many types of help for thematic projects, research networks etc. We should encourage the interest of DG Research which lost interest in the Humanities in recent years after some signs of interest for master programmes.

Regarding the uses of new information technologies, historians of science have been extremely active in recent years in developing several uses of the Internet in order to increase the accessibility of classical texts, be it printed texts or manuscripts, and other kinds of documents (pictures etc.), and to develop in this way a better study of primary sources which were previously difficult to reach. Artificial intelligence techniques are also increasingly used for the study of scientific texts, of their successive versions, of scientific reasoning etc. Last but not least, a number of universities in Europe have developed in recent years e-learning facilities. E-learning is certainly a most innovative way of teaching and of sharing knowledge, a way which we have to explore and implement at a European scale. The next steps to be taken by the increasingly integrated community of historians of science in Europe is to make a more systematic use of all these already existing tools in order to create a better awareness of our common scientific heritage with all its diversity and variety of contexts.

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\* A briefer version of this round-table discussion was published in *Centaurus*, vol. 49, Issue 2 (May 2007), p. 165–171.

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<sup>1</sup> Cf. C. Debru (ed.) (1999), *History of science and technology in education and training in Europe* (Luxembourg: European Commission Office of Publications).

## **INTERVENTIONS BY:**

### **Anne-Sophie Godfroy-Genin (Cachan, France) \***

“SCIENCE STUDIES UNITS” or “science studies research centres” have proven to be very fruitful initiatives to develop new perspectives in history and philosophy of science and technology. Furthermore, more and more topics, especially hot topics as nanotechnology, ethics and technology, more generally technology and society topics, require a pluri- or trans-disciplinary approach that can be found in that kind of centres where historians, philosophers, sociologists, epistemologists, education specialists, gender specialists, etc can collaborate and exchange views more easily than when they live in separate departments. The development of such pluri-disciplinary centres appears as a priority to develop a strong reflection in history and philosophy of science and technology.

### **Soňa Štrbáňová (Prague, Czech Republic) \*\***

BEFORE 1989, THERE EXISTED IN MOST countries of the Soviet Bloc stabilised research teams dealing with research into history of science and technology in the form of institutes or departments within the state directed Academies of Sciences. Their establishment and existence was in most cases determined by the fact that these Academies were usually structured by the pattern of the Soviet Academy of Sciences, where history of science and technology was pursued in the powerful Moscow Institute for History of Science and Technology. In spite of the political decision which enabled the existence of these groups and despite of strong political pressures, they usually played positive roles in the development of the field and in international co-operation, especially within the Communist Bloc countries. After the fall of the Iron Curtain this network was to a large extent disintegrated and in most post-communist countries the institutional base of history of science and technology either ceased to exist or became decomposed into small units within various university and academic institutions. For instance, in the Czech Republic since 1990 several attempts to establish a new meaningful institution that would integrate the scattered historians of science and technology have failed.

This short contribution cannot analyse the reasons of this unfavourable situation not only in the post-Communist but also in many other European countries, where technocratic approach to science has prevailed, history of science and technology as “genuine” or “equipotent” interdisciplinary field has been undervalued, its existing institutions frequently disbanded or cut down, and its financial and intellectual support largely decreased. In these countries we face the situation when students (both in sciences and humanities) have no motivation to get their degree in history of science as they have no chance of future career; and without professional successors our field might die-out. Luckily enough the ESHS is developing into a quite influential European organisation that represents our field at the level of the European structures and can stand for its interests. I urge that one of the important future tasks of ESHS would be well-considered promotion of the general acknowledgement (at the level of the EU structures and particularly ESF) of history of science and technology as a fully-fledged field along with the strengthening of its specific research and educational base. In the future, the establishment of a European Centre for History of Science and Technology could be an ambitious undertaking which might be decisive in further development of history of science and technology in Europe.

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**Andrzej K. Wróblewski** (Warsaw, Poland) \*

I AM QUITE SURPRISED BY THE REMARK that the history of medicine is in some sort of difficulties in some countries. The situation in Poland seems to be quite different. Since many years history of medicine is a fixed part of the curriculum in our medical universities. It is obligatory, so that every future physician in Poland must pass a course in the history of medicine. There are several quite good textbooks in the history of medicine published by Polish authors.

Now, the history of other sciences is in more difficult situation, because it always depends on whether there is someone who can teach it. Since we are in Cracow, I can give you an example of the Jagiellonian University which is the oldest and most prestigious Polish university. In this university regular courses on the history of science were given already hundred years ago by Professor Ludwik Antoni Birkenmajer, very well known authority on Copernicus and the history of astronomy. Every year he gave a course on the history of science. And now, as far as I know, there is no “Birkenmajer” in the Jagiellonian University, so there are no courses.

I have been teaching the course of the history of physics in Warsaw University since 1975. But I do not see anyone who will replace me after I pass away, because the number of people in Poland who could teach it is very limited. In other universities there are no courses, simply because there are no people who could do it properly. Thus, it is not only the question of opening positions but also the problem to find people who could fill these positions. If you take wrong persons they could do more harm than good in their teaching history of science.

**Soňa Štrbáňová** (Prague, Czech Republic)

OUR FIELD, THAT IS HISTORY OF SCIENCE, cannot develop further without the involvement of a new young generation of historians of science. However, in many European countries, including the Czech Republic, only a few positions for professionals in history of science exist, whether at the universities or in research institutions. This is one of the reasons why we cannot arouse young people’s interest in getting a degree in history of science; they simply do not see any perspective of a research or teaching position. The other problem is that often learned amateurs, like older science professors substitute for the missing professionals, but they usually teach traditional “biographical” history of science without doing any research and create a distorted image of what history of science is, not only in their students but also in the public. Such situation further decreases the reputation of history of science as a subject field and discourages young potential adepts. Unfortunately at the moment I see just little hope in solving this vicious circle at least in some European countries like the Czech Republic. In my view the ESHS should join forces and get more engaged in discussions on how to improve the situation, as I have already hinted before.

**Robert Fox** (Oxford, United Kingdom) \*\*

ONE THING THAT EMERGES strongly from the discussion so far is the diversity of contexts in which we have to function. It is certainly a good idea to encourage the European Union and other European authorities to make statements about the value of the history of science, medicine, and technology. But the reality is that in each of our various institutions we have to respond to the concrete opportunities and pressures that we face individually. Obviously these vary enormously from country to country, even within one country.

In Britain, for example, we have a very specific situation with regard to the history of medicine. Two things have happened here. One is that the Wellcome Trust has become an enormously powerful and generous sponsor of the history of medicine; as a result, several universities have units or other

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groups which are largely (though seldom wholly) financed by the Wellcome Trust. The result has been an explosion of research in the history of medicine on a scale that colleagues in the history of science and technology, which is generally less well funded, have difficulty in matching. The other thing that has happened is that the history of medicine, especially in its social aspects, has prospered as an area of study more accessible than the history of science and technology to students without a scientific background. This has struck me forcibly as someone who has spent all his teaching career in history departments, in other words in contexts where (in the British system) most students will have studied no science (especially physical science) after the age of sixteen. Such students can quite easily find subjects within the history of medicine that they can pursue, whereas serious work in the history of physics or the history of chemistry is virtually closed to them.

I say this to underline two points. First that, as historians of science, medicine, or technology, we have no choice but to adapt to the setting in which we work, if our discipline is to flourish. Secondly, we see how the very particular profile of funding in the British context has had a decisive impact on the discipline in a relatively short period of time. Money, in the form of scholarships, research grants, and academic posts, talks, and in Britain for two or three decades now it has talked loudly, with substantial benefits for those who have been able to profit by it. In the ESHS, we too shall be faced with a wide variety of opportunities, and there are none of them that we can afford to ignore. Hence the plea I have made several times, in my time as president, for us to open our doors as widely as possible to all approaches and tendencies that fall within our remit as historians. Openness and even a good dose of pragmatism are likely to take us further than *a priori* prescriptions about the form that in an ideal world our discipline should take.

For details of the British history of medicine and its sponsoring by the Wellcome Trust see among others:

- The Wellcome Trust, Founding Research in the History of Medicine:  
<http://www.wellcome.ac.uk/node8000013.html>
- The Wellcome Trust Centre for the History of Medicine, University College London:  
<http://www.ucl.ac.uk/histmed/people/research-associates/index.html>
- The Wellcome Unit for the History of Medicine, University of Oxford  
<http://www.wuhmo.ox.ac.uk/>
- The Unit for the History of Medicine, Centre for the History of Science, Technology and Medicine, University of Manchester: <http://www.ls.manchester.ac.uk/chstm/wellcomeunit/>
- The Centre for the History of Medicine, University of Warwick:  
<http://www2.warwick.ac.uk/fac/arts/history/chm/>
- History of Medicine, University of Newcastle:  
<http://www.ncl.ac.uk/historical/medicine/>
- The Centre for Medical History, University of Exeter:  
<http://www.centres.ex.ac.uk/medhist/>
- History of Medicine, Oxford Brookes University:  
<http://ah.brookes.ac.uk/historyofmedicine/postgraduate/>

### **Claude Debru (Paris, France)**

AGAIN THIS SITUATION IS VERY diverse. In France the history of medicine almost vanished, with only three specific positions existing at the University of Strasbourg, at the University of Paris V and at the Ecole Pratique des Hautes Etudes, in spite of a compulsory teaching during the first year of the medical curriculum. What is strongly encouraged is a combination of medical history and medical ethics. The situation of the history of science in France is more favourable, due to several CNRS research centers and their association with universities or other institutions of higher education.

**Michał Kokowski** (Cracow, Poland) \*

*Comment of the editor of the proceedings*

It is worth of adding in this context that in Poland, departments for the history of medicine were founded in universities (medical faculties) in 1920 and they are still alive and active. However, it was not caused by a wise support of rich foundations but by other factors, both external and internal, such as the recovery of independence of Poland in 1918 and very high consciousness of methodological and historical issues of some Polish scholars, including especially Władysław Szumowski (1875–1954).

More on this issue, see: [http://www.khm.cm-uj.krakow.pl/KHM\(inter\)1.html](http://www.khm.cm-uj.krakow.pl/KHM(inter)1.html) and Zdzisław Gajda, *Wydział Lekarski Uniwersytetu Jagiellońskiego* (Kraków: Uniwersytet Jagielloński Collegium Medicum, 2003), p. 114–118.

**Peter Heering** (Oldenburg, Germany) \*\*

WHEN DISCUSSING THE PERSPECTIVES of the history of science with a focus on educational aspects, I think it to be important to stress some aspects that might be taken as being important for the future intensification of this field in the universities. Even though this intervention is made mainly from a perspective that results from the situation in Germany, yet, I think that it might be relevant to other European countries as well.

Like other areas, education is currently undergoing significant changes, and I consider it to be relevant to adjust the position of the history of science as an academic subject to this changing reference frame. One relevant aspect lies in the intensified economic pressure on universities. This results in a challenge towards several academic disciplines that can have neither many students nor many third-party funds. Unfortunately, among these disciplines is also the history of science.

From my point of view, one way of dealing with this new challenge lies in demonstrating more explicitly the usefulness of history of science than hitherto. In doing so, it appears to me insufficient to do this in an internal manner — even though I am considering history of science to be relevant by itself, I do not expect this argument to be persuasive to someone who is looking for a potential to save expenses.<sup>1</sup> In this respect, subjects such as general history or philosophy might appear as allies. However, I would like to make my argument in another direction.

In doing so, I would like to take a brief look at the situation of the history of medicine in Germany. Here, the subject is fairly well established, one reason for this can be seen in an aspect of the structure of the course of medical studies: For the students, it is mandatory to take one course in history and ethics of medicine. Up to now, something comparable does not exist in the sciences.

Recently, fraud and unethical behaviour in the sciences have been a topic in the mass media.<sup>2</sup> In this context, questions of how to behave adequately as a scientist have become issues that are considered to be relevant. In this field, it appears to be necessary to include these aspects in the curriculum for science students — this might be one aspect where historians of science could offer courses. In doing so, it could be possible to develop in the eyes of the science faculties a usefulness that makes it easier to keep an established group beyond the retirement of the actual professor, a moment which puts a particular threat with respect to being cut down. Moreover, establishing such courses as standard might even offer

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<sup>1</sup> Apart from that, each academic field could (and should) be able to make such an argument, yet, in order to be able to compete successfully with other disciplines it appears to me of importance to show the utility and to accentuate the need for history of science also for other disciplines.

<sup>2</sup> In this context I am referring to the debates on Jan Hendrik Schön's work at Bell Labs as well as to the so-called 'cloning scandal' connected with the Korean researcher Hwang Woo Suk. The latter case is also exemplary as it also caused ethical debates with respect to stem cell research on a more general level.

the opportunity to establish history of science in science faculties who do not have any connection to this field up to now.

However, being familiar with scientists I am well aware that the possibilities to make courses on history / philosophy / ethics of science compulsory are not that strong. Yet, there is another field where the necessity to have a strong training in this field appears to be even more convincing, and here lies from my point of view a strong opportunity: It has become evident in recent years that science teaching should not be limited to the laws and facts of science, on the contrary: Aspects such as contextual teaching and literacy with respect to the nature of science have gained influence and importance. This shift of the focus of science teaching requires science teachers with different competences — they have to have an understanding of how scientific knowledge is produced, how scientific controversies are started and settled, how consensus about scientific ‘facts’ are made, etc. In this context, historians of science are able to communicate competences to teacher students that will enable them to design and realise their teaching according to the recent standards. Thus, developing modules with a particular focus on teacher students might enable historians of science to establish themselves as being not only useful in the field of teacher training but even to become indispensable.

In order to realise this scenario, it appears to be insufficient to make clear to faculties and university authorities this potential of the history of science. From my point of view, it appears also to be essential that historians of science offer courses that are designed in particular to be useful to future science teachers. It does not seem to be sufficient to open to them the standard courses that have been taught up to now for future historians of science as well as for students who have an intrinsic motivation for this field. On the contrary, the requirements from the point of view of teacher students are different, thus, if the courses do not address these needs, they will probably be failures. And there is another aspect that has to be taken into consideration: Most courses of study are to undergo significant changes as a consequence of the so-called Bologna process. This offers an opportunity as discussions are taking place of how to restructure the course structures. However, this means also that this is a momentarily opportunity — if it is not used it is unlikely that courses are going to be reorganised in the very near future. As a result, historians of science have to decide whether they are going to use this opportunity now or whether they are intending to stay out of the professional teacher training for the next decades.

### **Birute Railiene** (Vilnius, Lithuania) \*

ACADEMIC LIBRARIES ARE STILL underestimated in the field of history of science. The electronic catalogues they compile are usually used only for books, in some cases — for special collections of manuscripts or raria. But the information systems of electronic catalogues are powerful enough to be used for article databases, which could be accessed via internet and free of charge. The main concern of a librarian is to collect references about published works and make the data searchable.

At the end of the conference, the question of “making a history of science widely accessible” was asked. The answer could be from the first sight simple, and hopefully not harmful to the traditional minds: involve movie makers, use the idea of award for the best screenwriter in a competition “The scientific invention, which changed the world”. It could be even a series of short films, but necessary professional.

### **Hans-Joachim Braun** (Hamburg, Germany) \*\*

#### *Comments on the current state of history of science and technology*

SOME COLLEAGUES TALKED ABOUT the paradoxical situation in the former Eastern block countries. But there are severe problems in the discipline of the history of science and technology in the Western Part of Europe also. On the one hand the history of science and technology seems to be in high demand in the media. The media deal with science and technology subjects all the time and they often refer to history also; they think that the history of science and technology can provide some orienta-

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tion regarding current problems. However, the interest in the media on long-term developments in the history of science and technology, the *longue durée*, is limited. This is not what the media and the policy makers seem to want. They prefer to listen to the messages of our colleagues from the sociology of science and technology who can claim, with some justification, that they are better equipped for giving advice to politicians than the historians. Sociologists often focus on developments after 1945. In order to obtain money for research projects, scholars often have to look for sources outside the university, sometimes to organizations who have some connections with business. Of course these organizations want to have some proof of the practical relevance of research for solving current scientific, technological, economic, social or cultural problems.

Research on Ancient Greece or Rome or on the Middle Ages does not seem to be very relevant in this context and the same goes for studies which stretch over a long time period, five centuries, let's say. But, in spite of those problems, my plea is: Don't forget *la longue durée*. Don't be tempted too much by easily accessible money when tackling fashionable, 'useful' topics. To an extent there are many similarities between what goes on in high level football, for example in the English Premier League or in the German Bundesliga, in Big Business, and in Academia. There is a distinct emphasis on quick success, not so much on sustainable development, although, thankfully, the latter has, for some time, been regarded more highly in certain quarters. But this emphasis on quick, generally material, success can't be everything. We have to grant young people, be they academic researchers or footballers, some time to mature. Historians in academia should be given time to deal with long-term change and we should not ask about immediate practical uses all the time. Political goals change constantly, but academic institutions which try to run after these political goals will sooner or later be depleted of substance and of a sound supply of knowledge and expertise which has to be there independent of rapidly changing present-day demands. A 'core business' of historians is dealing with change, especially with long-term change. Knowledge about this is a general (not a specific) prerequisite for making correct decisions concerning the future. Regarding present-day problems, a historian cannot offer more than this, but this is quite a bit already.

### **Elvira Callapez** (Berkeley, USA; Lisbon, Portugal) \*

THE FIELDS OF HISTORY OF SCIENCE and history of technology have not received enough attention from the European Union (EU). I would like to recommend the creation of a commission that integrates historians of science, technology, and economics within the EU. This commission would study the creation of a network between the north and south centres, in order to talk and negotiate with each member state for effectively establishing the history of science and technology in all curricula of high schools and Universities of Humanities and Sciences.

In addition, the EU should arrange a scholarship mechanism, i.e., grants, for scholars of all ages to sponsor their research and travels while they are sharing experiments and knowledge between universities and research centres all over the members states. This process could become a generalised practice to improve the international meetings on the history of science and technology by less developed countries. In concert with the ideas of the pioneer, George Sarton, the History of Science and Technology needs to become a primordial field in all levels of learning.

### **Claude Debru** (Paris, France)

I THINK THE IDEA OF REACHING the European Parliament should be very much considered, because they should have a kind of education committee and we would be able to reach them.

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**Roman Duda** (Wrocław, Poland) \*

LISTENING TO THIS ROUND-TABLE DISCUSSION on the “History of science in education and training”, I cannot help the feeling that every speaker has its own vision of the subject “history of science” and considers it to be commonly shared by all present. However, it is not the case and some of those visions are even not compatible. It seems to me that the main difference lies in the perspective. If (as “true” historians) we do our best to give full justice to an epoch we are interested in, we emphasize concepts, ideas, methods etc. which were highly influential in that epoch and neglect those which sometimes gained value later on but then were unimportant. If we do not, we risk to offer a false picture of the epoch. But if we turn to people interested in the development which led to the present state of science, our attitude must be different. Now we emphasize concepts, ideas, methods etc. which are important at present, although in old times, when they were born, they often were of minor value and only later on evolved up to their present status. To give one example: theory of sets was born in the second half of 19th c. but was met with much resistance and considered unimportant if not dangerous. In the once influential book *Vorlesungen ueber die Geschichte der Mathematik im 19. Jahrhundert* by F. Klein (published 1926!) there is not a word about that theory. But now, after the theory became all-important serving as a foundation for mathematics, its (set-theoretical) common language, cradle of new theories like topology, functional analysis etc. — no modern book on the history of mathematics can avoid covering the development of that theory in some length. There are also other visions of the history of science which appeared in the discussion, but already those two, mentioned above, allow me to ask the question: talking of history of science, what really we have in mind?

**Claude Debru** (Paris, France)

SURELY, THERE ARE MANY WAYS OF writing the history of science. My remark to your comments would be that we need to train real historians to deal with the history of science. We have scientists but we do not have enough historians to deal with the history of science. This is a matter of concern at least in my own country, France. Perhaps, the situation is different elsewhere.

**Frank James** (London, Great Britain) \*\*

FOLLOWING ON THE PREVIOUS SPEAKER but also particularly engaging Hans Joachim Braun’s views on *la longue durée*, the problem I have found with the media, after much experience, is that they are depending strongly on old grand narratives of the history of science: “there was scientific revolution”, “there was chemical revolution”, “there was industrial revolution” etc, all of which have been discredited or seriously problematised. Trying to get over to the media the detailed work that has been done on local contexts, and looking at how science and society interact over time within very specific localities is very, very hard. We thus need to be careful when we present history of science in the media and ensure that we do not go back to the grand narratives, especially as there are always strong temptations with the media’s willingness to encourage simplicity and familiarity. It will be a gradual process to get through some of new ideas in the history of science, technology and medicine to the general population by the media, but that is one of the things that the British Society for the History of Science is trying to do.

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**Ida Stamhuis** (Amsterdam, The Netherlands) \*

I TEACH HISTORY OF SCIENCE to students of the natural sciences, including mathematics and informatics. These courses are small, but obligatory. When teaching such a course it is important to realize that the course's aims according to the university officials do not entirely coincide with my personal aims. The official aims are to give students some 'general education' and more specific to give them insight in the interdependency of science and society. Although I entirely agree with the relevance of these goals, I have additional aims. Besides convincing students that the state of science is a product of a historical process and that the course of science is not necessarily progressive, I wanted to show the beauty of the field of history of science and make the students so enthusiast that they will later still be interested in history (of science). My goal is that they are later still convinced of its relevance.

**Romualdas Sviedrys** (New York, USA; Vilnius, Lithuania) \*\*

MY COMMENTS WILL DEAL WITH the teaching of history of technology and history of science to undergraduate engineering students. Teaching undergraduates in a primarily engineering school one confronts technology savvy people for whom history of technology, history of science — any kind of history — is the kiss of death. Our courses are not required — that would make for me a kiss of death experience. One has, therefore, to invent a "hook", a gimmick to arouse their interest.

One such gimmick is to have them discover how new technology is created. A simple ten-step model is used and students are asked to reject it or basically confirm it with some modifications proposed by them, by asking each student to pick a given technology and in that historical example to verify whether in that case study technology goes through the proposed stages. Going through such exercise each student gets a sense of how long does it take to move from idea to an actual product that reaches the market, what technical problems must be overcome, what resources were expended, what barriers to technological innovation had to be overcome, as well as examine the stimuli that encourage inventors and innovators to persist in their quest.

When you bring each student's case study together — new patterns often emerge. One pattern is that students notice that at each stage there are feedback mechanisms that require a return to an earlier stage because new basic knowledge is needed, or new materials have to be developed, or all kinds of additional problems have to be solved. Pooling data together allows each student to become an expert in his case study and produces a more active, if not enthusiastic participation in what becomes a joint enterprise. Attention is paid now to those who make contributions at each stage; or to the overlaps that emerge between two consecutive stages as it becomes not easy to decide when a stage ends and another one begins. Students become interested in examining what factors determine adoption rates of new technology, as well as the impact and social changes that technologies generate as they become widely adopted. After this exercise one has a changed audience willing to begin to study history for its own sake.

**Andrzej K. Wróblewski** (Warsaw, Poland)

ONE MORE REMARK, BECAUSE Prof. Debru said that there are very few historians to teach the history of science. I think that a professional historian can teach history of science say up to Copernicus and perhaps including Galileo but not later epochs, because he or she wouldn't understand technicalities of the subject. In order to teach the history of mathematics, one first has to be a mathematician, in order to teach history of chemistry, one must understand chemistry, etc. Thus, if we are talking about the history of the last four centuries, there is always only one route — from a profession to its history. But of course this could be very dangerous. In Poland we have had cases of some ageing physicists who decided that they could teach the history of physics. I know of two such examples which were

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disastrous, because these professors didn't understand what history is. In their courses they presented the history of physics as a chronicle, or a telephone book, you know, just a list of years, names, and events. One of these self-appointed "historians" even wrote a brochure which was a catastrophe, because the history of physics can not be just a boring list.

Such dangerous situations might happen and in order to prevent them we have to teach some historical tools and methods to people who have diplomas in various fields: mathematics, physics, chemistry, medicine, etc. Then the history of each field of science could be taught by them properly. There is no other way. So we should probably think about how to attract people from different professions to transform them into historians of a given discipline.

### **Mitchell G. Ash** (Vienna, Austria) \*

I REALISE THAT THE TIME IS MOVING ON and there is another session. Nonetheless I feel that Professor Wróblewski's statement in response to Claude Debru requires a response in its own right.

First of all, let me make a simple factual point. In German-speaking countries an increasing number of general historians are teaching history of science, and several chairs in history institutes — for example in Berlin, Cologne, Halle, Braunschweig, Stuttgart and Vienna — have been taken by scholars who specialize or have done important work in that field. So, although Professor Debru's statement that only very few historians teach history of science may be true in some European countries, perhaps it is not true for all of them. The limits to these numbers, however, are still quite real.

In the United States, the situation is different. I think it is correct to say that very large percentages of graduates from history of science programs in that country are employed in history departments. This suggests that historians in the USA realize that they need the expertise of historians of science, because science and technology have become important factors in history. This is a positive development, which is leading toward increasingly constructive interactions between history of science and general history. But this also means that the questions addressed by scholarship in history of science, as well as the audiences for that scholarship, can no longer be limited to members of scientific disciplines.

This brings me to a second point, in response to Professor Wróblewski's statement that historians are not capable of teaching history of science after Copernicus, because they lack the scientific competence to do so. I think that this depends entirely upon what you think the history of science is. If the history of science is nothing but the technical history of scientific disciplines, as Professor Wróblewski appears to believe, then his point may have merit. If you believe, as I do, that the history of science is part of the broader history of modern life, then not only the theories of Einstein or narrow technical issues in the history of chemistry, mathematics or other such disciplines, but also the social, political, economic and cultural significance of the sciences become important issues to address. And these are issues that general historians are well qualified to discuss. So perhaps what is needed is training in historical methods for people with scientific backgrounds wishing to write history of science — as Professor Wróblewski suggests and which I strongly support — and also some familiarity with scientific thinking and methods on the part of general historians who wish to address the broader issues just mentioned. Then history of science would become a genuinely interdisciplinary enterprise.

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**Vladimir Kirsanov \***

FRANKLY SPEAKING, I CANNOT SAY ANYTHING because I cannot do anything to facilitate solving our problem. I would like you to get a more clear and true picture of the status of science in Russia today. The point is that in my country the authorities (I mean the highest authorities as well as the academic authorities) are not interested in the development of science. They are mainly concerned with immediate results and the immediate profit, and until there is a possibility to get an immediate income from the oil tube they will pay no attention to the development of scientific education and will have no intention to invest into science properly. The scientific community is a poorest and the most neglected part of the Russian society. In these circumstances it is impossible to speak of an improvement of the teaching of the history of science because even in such fundamental disciplines as physics and mathematics the number of available positions for those who are graduating from universities is surprisingly small, the salary is unacceptably low, and the investment into experimental equipment is below all possible limits. As a result many graduate students of physical and mathematical university departments have to work in banks and commercial firms that have nothing to do with science, and the most talented go abroad. We are face the threatening problem when the scientific community is growing older and older because the young generation does not go into science. Nevertheless a certain number of very good scholars still continue to exist in Russia, they are eager to co-operate with their Western colleagues in every possible ways. So, when you are planning scientific projects and educational programs do not forget of us. We are alive!

***Final remarks by Claude Debru*** (Paris, France)

NOW I THINK WE ARE GOING TO CLOSE this round-table discussion. Perhaps I could make a small statement. I would urge to make use of every possible existing tools to improve co-operation, and indeed there are many existing tools which are available, including the bilateral tools which I mentioned earlier, French-Italian University which is located in Grenoble, as the same pattern as the French-German University in Saarbrücken. There are also European doctoral programmes where you may apply but I think there is no European doctoral programme in the history of science. Perhaps we should really consider of creating that. Thank you very much.

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\* The late Professor Kirsanov (26 December, 1936 –12 May, 2007) worked in the Institute for the History of Science & Technology, Russian Academy of Sciences, Moscow.